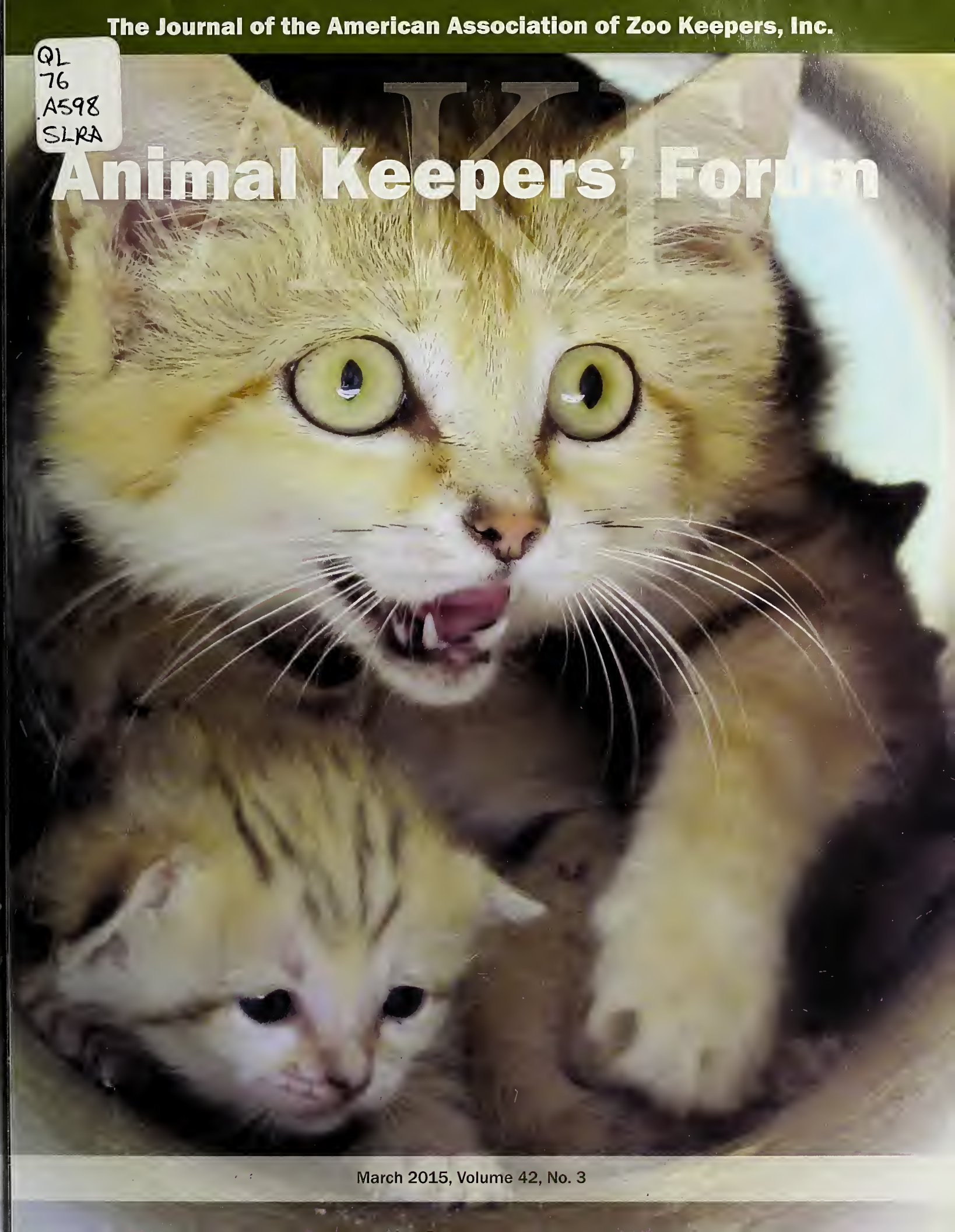


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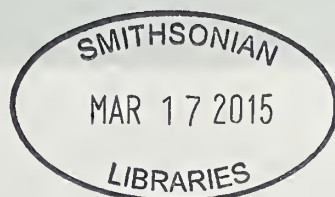
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The American Association of Zoo Keepers, Inc. exists to advance excellence in the animal keeping profession, foster effective communication beneficial to animal care, support deserving conservation projects, and promote the preservation of our natural resources and animal life.

About the Cover

This month's cover features a sand cat (*Felis margarita*) and her kitten. The photo comes to us from Nancy Vandermeij of the Exotic Feline Breeding Compound's Feline Conservation Center. This litter of sand cat kittens was the first born in the United States since 2009. The sire came from the Cincinnati Zoo and the dam came from the Tallinn Zoo in Estonia. The international captive population is just under 1000 animals and is managed as a Red Species Survival Plan®.

The Feline Conservation Center reports that elevated swings, suspended swinging milk crates and hammocks are an important part of the enrichment program for their sand cats. The Center also used motion triggered cameras to monitor the introduction process of the sire and dam and record breeding.

These tiny (3-11 pound) cats live in sandy and stony deserts in northern Africa and the Middle East. They are the only cats that live foremost in true deserts. Sand cats have thickly furred feet that are well adapted to a desert environment and are tolerant of both extremely cold and hot temperatures. They can live far from water sources by utilizing moisture from their prey (rodents, snakes, etc). They are a pale yellow color with a ringed tail. The sand cat's ears are large and set widely apart and low on the sides of the head. They are nocturnal in their native habitat. The sand cat is listed as *Near Threatened* by the IUCN.

Articles sent to *Animal Keepers' Forum* will be reviewed by the editorial staff for publication. Articles of a research or technical nature will be submitted to one or more of the zoo professionals who serve as referees for **AKF**. No commitment is made to the author, but an effort will be made to publish articles as soon as possible. Lengthy articles may be separated into monthly installments at the discretion of the Editor. The Editor reserves the right to edit material without consultation unless approval is requested in writing by the author. Materials submitted will not be returned unless accompanied by a stamped, self-addressed, appropriately-sized envelope. Telephone, fax or e-mail contributions of late-breaking news or last-minute insertions are accepted as space allows. Phone (330) 483-1104; FAX (330) 483-1444; e-mail is shane.good@aazk.org. If you have questions about submission guidelines, please contact the Editor. Submission guidelines are also found at: aazk.org/akf-submission-guidelines/.

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We are animal care professionals. We chose this path because of our deep passion for animals. We strive to give our animals the best care possible, gleaned as many valuable resources along the way to ensure that our knowledge-base is current. When we receive new animals in our care, we study, research, and dialogue with others with the aim of providing the best care possible for the animals in our charge. Our learning process is both formal and informal. In short, we are life-long learners.

This fostering of continuous learning and development transforms our jobs from that of skilled laborers to highly trained and motivated professionals. It is not, however, a simple practice of absorbing information as quickly as it can be accessed. Rather, it is a process which involves a complex understanding of application and relevance. It can reinforce what we already know but it can also challenge our current way of thinking. In its purest form, the process of learning requires that we take a step back and unlearn some of our previous assumptions.

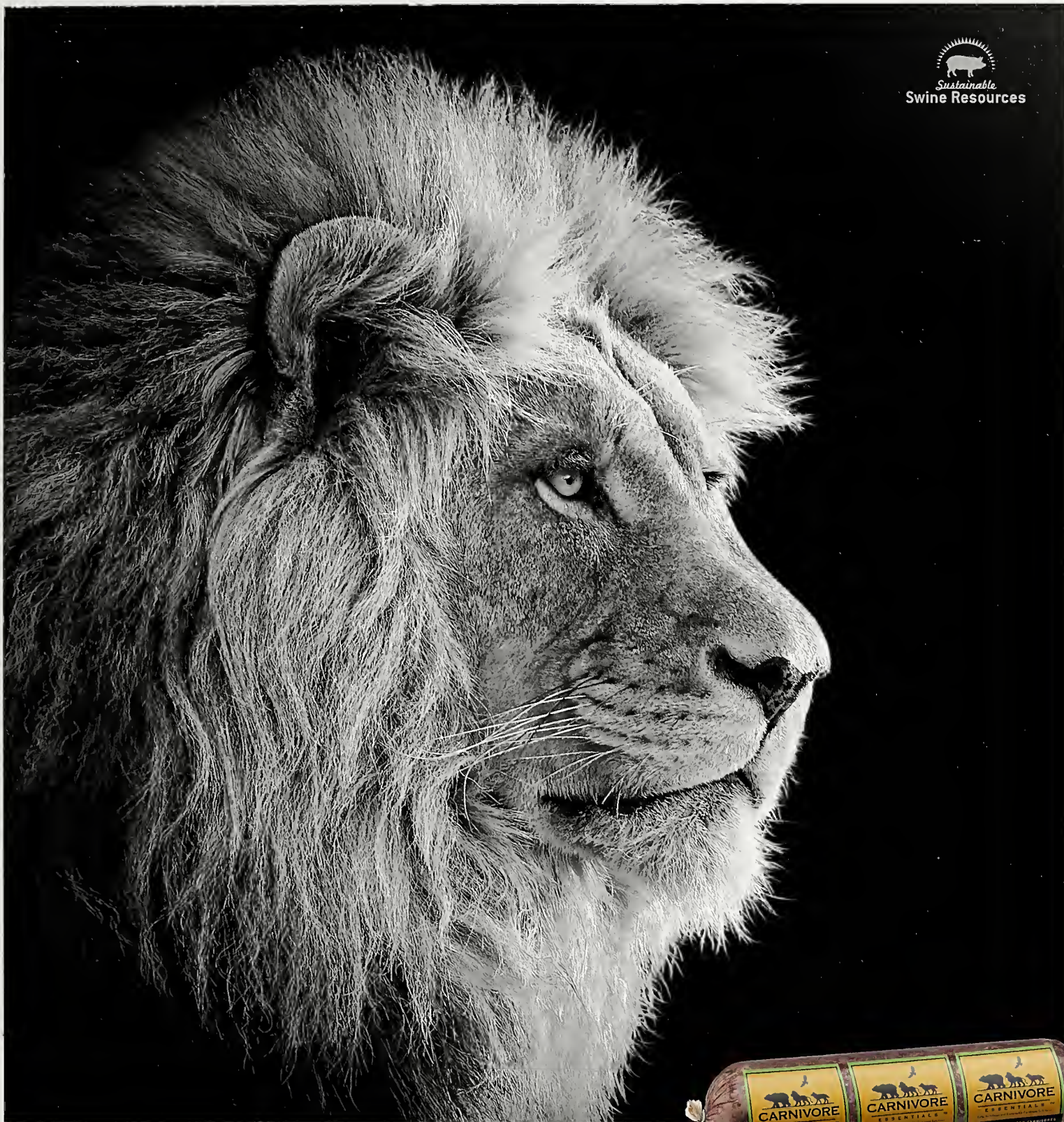
I mean no offense when I say that collectively, we can sometimes be very set in our ways, averse to change and quick to take a stand on one side of the fence or the other when it comes to controversial topics. Sometimes, it's our passion which drives our convictions. Other times, limited knowledge secures our viewpoint. When I first began my career in animal care back in the early 90s (back in the twentieth century), there was a joke told among keepers that stated the only time you will ever get two keepers to agree on anything is that another keeper is "doin' it the wrong way". Although we have come a long way since those early days in my career, we still find ourselves tested by events or perspectives which challenge our current beliefs with regard to animal care.

In this month's AKF, you will come across two articles which will, at the very least, create some interesting discussions. By printing these articles, we are not asking you to take a stand on either side of the subject of population management euthanasia, but rather, read these articles and try to read from as many perspectives as possible. Stand back and allow yourselves to be challenged; you may find that by doing so, you either gain new perspectives, stand fast in your current beliefs, or maybe a little of both. Either way, I think you will find the content interesting and stimulating. At the very least, it will generate interesting lunch table discussion.

Controversial topics usually bring out the passion in all of us; it's our first line of defense. And once the proverbial dust settles (if such there be), the real dialogue and exchange of ideas begins. Dialogue is good for our profession. Communication is key to advancing excellence in animal care. Our passion for animals drives our commitment to our profession. Our knowledge base helps to sustain that drive. It's a synergy that hones our profession and provides great opportunities for advancing excellence in animal care.

As always, I welcome your thoughts and input. E-mail me at bob.cisneros@aaazk.org.
Respectfully,

Bob Cisneros



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April 13-18, 2015

Animal Behavior Management Alliance (ABMA) Conference

Copenhagen, Denmark
For more information visit: theabma.org.

June 1-5, 2015

Prosimian TAG Meeting and Workshop

Myakka City, FL
Hosted by The Lemur Conservation Foundation.
For more information contact Alison Grand at: agrand@lemurreserve.org.

June 1-5, 2015

Conservation Breeding Centers for Wildlife Sustainability

Smithsonian Conservation Biology Institute (National Zoo), Front Royal, VA
For more information go to: SMConservation.gmu.edu

June 2-4, 2015

Chimpanzee Husbandry Workshop

Detroit, MI
Hosted by Detroit Zoological Society
For more information go to: detroitzoo.org/animals/chimpanzeeworkshop

June 14-18, 2015

International Rhino Keepers' Workshop

Chester, England
Hosted by Chester Zoo
For more information and Call for Papers, go to: rhinokeeperassociation.org/rhino-keeper-workshop/

September 9-13, 2015

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For more information visit: iczoo.org.

September 17-21, 2015

AZA National Conference

Salt Lake City, UT
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October 5-9, 2015

Giraffe Care Workshop

Colorado Springs, CO
Hosted by Cheyenne Mountain Zoo
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September 27 - Oct. 1, 2015 AAZK National Conference

St. Louis, MO
Hosted by Saint Louis Zoo and St. Louis Chapter of AAZK
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Conference

Sunday, September 27, 2015:

Icebreaker

Monday, September 28:

Keynote Speaker
Jenny Gray, Zoos Victoria,
Presentations and Workshops

Tuesday, September 29:

Presentations and Workshops

Wednesday, September 30:

Zoo Day

Thursday, October 1:

Presentations and Closing Banquet

Post-Conference Trip

Friday, October 2, 2015

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Call for Abstracts

Papers:

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Guidelines for Abstracts:

Abstracts should be no more than 250 words and submitted as a Microsoft Word document via e-mail to pdcaazk.org.

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Deadline for abstracts is May 1, 2015.

Authors will be notified regarding their acceptance by June 1, 2015. All papers must be received by July 15, 2015 to be included in the conference program. Please contact pdcaazk.org with any questions.

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Three conferences in one?!

An adventure in Orlando

Beth Ricci - Utica Zoo

Three conferences were being held in one location over the course of 11 days. It may be the first time, and possibly the last, that an opportunity such as this has come around. The American Association of Zoo Keepers' Professional Development Grant offered me the resources to grasp this opportunity. I travelled to Orlando, Florida for 10 amazing days of learning and networking. Attendees stayed at the Coronado Springs Resort, Disney for the American Association of Zoo Keepers (AAZK), Association of Zoos and Aquariums (AZA) and International Marine Animal Trainers Association (IMATA) annual conferences. It was a whirlwind 10 days.

The first of my conference experiences was the AAZK annual conference. Unfortunately, I missed the first full day of sessions due to travel but I was able to arrive in time to get registered and tour the resort. On the second full day of the conference I was able to see some great sessions on working with animals, working with other keepers and sharing of information across facilities. It was most helpful to see presentations about hand rearing and operant conditioning training. One of the most interesting presentations was about veterinary pathology. It is a discipline that keepers do not often delve into, yet the presentation was quite interesting and gave me a different perspective on the health of species and what is learned after an animal's death.

On my second day I was able to tour the Jacksonville Zoo, the Lube Bat Conservancy and Santa Fe Teaching Zoo. The Jacksonville Zoo had an amazing new Land of the Tiger exhibit with a great tiger training wall for visitor engagement and trails to aid in animal enrichment opportunities. Our trip was stalled for a bit while our bus needed repairs so the excitement continued as I got to visit more of the zoo than was originally planned. I had to make a trip over to see the squirrel monkeys, as the Squirrel Monkey Species Survival Plan program leader. They are one of only a few facilities that exhibit squirrel monkeys in two different locations. We finally hopped back on the bus and made our way to Lube Bat Conservancy. I am personally fascinated by bats so this facility provided me with an up close look at several different species of Old World fruit bats. We got to hear about some of the amazing

work the conservancy is doing to save bat species. Our trip ended at the Santa Fe Teaching Zoo. We were able to see all of the hard work of the students and the great campus that they take care of. They also served us an amazing meal to cap off an exciting and long day. All three facilities were amazing and made for a great day.

My third day brought additional presentations on animal training, conservation activities and workshops. I was pleasantly surprised by the workshops. I had originally hoped to take different workshops but once I registered, I realized that the workshops had filled up quickly. I had reluctantly chosen a workshop entitled "Handling change and transition in the workplace." Melaina and Susan really created a fun workshop and made me realize just how much change and transition I had already experienced in my career. It was a real eye opener for me and I value the time spent in this workshop. One important message that I took away was that change is hard, but it is necessary to move forward. The second workshop was "Marine Mammal Training and Terminology." This was a great review of principles and practices that we use daily as animal care professionals and I personally use when training the Utica Zoo's California sea lions.

Day four was when the scope of multiple conferences started to take effect. Representatives from AAZK, AZA and IMATA started to converge in one location. I was able to bounce around between meeting rooms this day. This meant some time in AAZK presentations, and then some time in AZA presentations. The halls were bustling with people, some of which I knew, some I knew of, and some that I was soon to meet once I scanned their name badges. After meeting and networking with fellow zoo keepers over the last three days, we were able to end the day with the AAZK Banquet. Fun was had by all and I was able to have my picture taken with Mickey and Minnie!

The AZA annual conference was in full swing on my fifth day in Orlando. There were presentation and workshop options available every hour of the day from 8 am to 9:30 pm. I was able to pop in on a few Taxon

Advisory Group (TAG) meetings, learned about some field conservation initiatives and was able to learn the full scope of the 96 Elephants campaign. The end of the day brought an animal training seminar, "Non-food reinforcers: Maximizing Effectiveness – Advanced Training Seminar" by Ken Ramirez. As Animal Training Coordinator for my facility, I felt that

I highly recommend attending a conference or workshop when you can. The value you can gain from the educational experience and the networking with zoo professionals is priceless.

this workshop brought a different perspective that we as trainers often miss. Relationship building with our animals is critical to assess behavior.

On to day six! At this point I was getting tired of sitting down! As an animal keeper, we don't do that well. I'm used to doing a lot of walking during the day so sitting for hours on end can be a challenge. The morning did involve sitting for more presentations but they were all valuable. I was able to present squirrel monkey population statistics at the New World Primate Taxon Advisory Group meeting. I was then able to spend a little bit of time at the Marine Mammal TAG meeting. I know it sounds strange, primates and marine mammals. In my keeper position I am fortunate to care for primates, sea lions and red pandas so all of these meetings were valuable for my knowledge base. Around mid-day, I began my IMATA experience with a day trip to SeaWorld Orlando. As an IMATA registrant, I was able to accompany a large group of marine animal trainers to SeaWorld for a day of training demonstrations and behind-the-scenes tours. Later in the evening, all of the conference delegates from IMATA and AZA joined us at SeaWorld for an icebreaker. I had another amazing evening in Orlando.

My seventh day at the conference began the concurrent sessions between IMATA and AZA. It was difficult to choose which sessions

to attend but the organized program guide allowed me to mark out which sessions I wanted to attend. I was able to attend sessions on accreditation, exhibit design, animal welfare trends, and various IMATA presentations. That was all before lunch! After lunch were more IMATA presentations and a discussion on SSP sustainability. A reception was later held in the amazing exhibit hall. There were hundreds of companies showing their wares. I took home a lot of free pens and materials from the companies to show to staff at our facility. The evening ended with another insightful animal training discussion by Ken Ramirez.

Day eight started a little later than previous days, mostly because I wanted to sleep in a little! I was able to get to some additional IMATA behavior and education presentations that were inspiring. I later visited the exhibit hall for the poster presentations. It was great to see fellow keepers and researchers showing the amazing work that they do. I was especially interested in the exhibit design presentations of day nine. I was also fortunate to attend a session on internship programs as we are always trying to improve our program. The afternoon of day nine took us to Disney's Animal Kingdom for a day at the park and behind-the-scenes tours. My final day was all IMATA. I attended behavior and research presentations, experienced the fun of Animal Jeopardy and finally, the IMATA Banquet.

This experience was one of a kind. It was a long ten days that included meeting fellow keepers, zoo administrators, marine animal trainers, meeting up with old friends, being introduced to new friends and absorbing a wealth of information that I am still trying to process. I was able to take a whole notebook full of notes from the conferences that I will be able to use to help me be a better animal keeper, trainer, coworker and employee. I would like to thank the AAZK Professional Development Committee for providing me the grant that was instrumental in allowing me to attend, as well as the Utica Zoo and staff for assisting me with expenses and allowing me to be gone for such a long conference experience. I would also like to thank the Walt Disney World Resorts staff and volunteers for their hospitality, and my conference roommates for cramming into our rooms so we could save some money! If anyone has the opportunity, I highly recommend attending a conference or workshop when you can. The value you can gain from the educational experience and the networking with zoo professionals is priceless. 🐅

Beth's attendance at the 2014 AAZK National Conference was sponsored in part by the AAZK Professional Development Grant. To apply for this grant, or to get information on any of our other grants, go to: azzk.org/committee/grants-committee/

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Nationwide Survey of Keeper Attitudes and Knowledge Regarding Population Management Euthanasia: Initial Results

David Powell, Associate Curator, Bronx Zoo, Wildlife Conservation Society, Bronx, NY*
Matt Ardaiole, Keeper, Sacramento Zoo, Sacramento, CA*

**The data presented in this paper do not necessarily represent the views and opinions of the authors nor the policies and/or practices of the institutions they represent.*

Introduction

Earlier this year we ran a nationwide survey of zoo keeper knowledge and attitudes about population management euthanasia (PME). We defined this in the survey as: "humane euthanasia of an animal for reasons unrelated to its medical condition. This may include euthanasia of offspring, non-reproductive animals, post-reproductive animals, or geriatric animals, to manage the population of the species". The introduction to the survey discussed the current issues with sustainability of zoo animal populations in the United States, possible reasons for the "sustainability crisis", and some information about philosophical approaches to PME or "culling" in zoos. Our paper at the 2013 AAZK conference goes into greater detail on sustainability issues in zoo populations (Ardaiole & Powell, 2013). Population management euthanasia has been increasingly discussed over the past five years or so by individuals inside and outside our profession, as well as in an article in this journal (Houston et al., 2011) and at an extended paper session at the 2013 AAZK conference (Ardaiole & Powell, 2013). It is clearly a contentious issue and likely one that we shouldn't expect everyone to agree on. Our goals in doing the survey were to 1) find out what keepers know and feel about this management practice, and 2) use the results to educate zoo staff at all levels about PME and how it might be used to address sustainability issues.

We are also submitting two manuscripts for publication in Zoo Biology with more survey results. Hopefully these will be available online sometime in 2015.

Methods

Our survey was anonymous, and responders did not have to provide their job titles or the name of their institution. The survey was distributed via a SurveyMonkey® link on the AAZK website. We received responses from 520 keepers plus 99 other responses from individuals currently employed in animal care in zoological settings but who did not provide their title. We added these responses to the sample presented here. We removed managers, veterinary personnel, individuals from overseas, and volunteers/interns when they provided information identifying them as such. At least 80 different U.S. institutions were represented in the sample.

Results

Knowledge and awareness of euthanasia

Table 1 shows the results of several questions related to keeper knowledge of euthanasia. Overall, keepers were very aware of the practice and/or policies related to it. When we looked at the data before and after the highly publicized euthanasia of a giraffe in Copenhagen, we found that awareness of PME in foreign institutions increased significantly after the press coverage (67.5% vs. 88.7%; $z=-6.38$, $p<.0001$). A little over half of our responders were aware of instances of PME at their institution. The difference between the number of keepers who were aware of PME events at their institutions, and the number that was not, was a statistically significant difference ($\chi^2=4.06$, 1 df, $p=0.044$). We did not ask what taxa of animals were involved in the PME events the responders were aware of.

Most responders (70%) said they were involved in the decision-making process at their institutions when euthanizing an animal for medical reasons; 23% were not involved. We suspect that all or most keepers provide information used in the decision-making process concerning medical euthanasia (e.g. reports on the animal's condition) even if they themselves are not at least partly involved during medical euthanasia decisions. Most keepers (86%) agreed with the use of medical euthanasia and 13% answered that they generally agreed but not always.

Thoughts and attitudes about PME

We asked if the euthanasia policy at an institution was ever a factor in accepting or declining a job offer; 98% of keepers said it had not been. We asked whether keepers would consider changing institutions if their current institution began practicing PME. Most (44%) said they would not consider changing institutions, 37% were unsure if they would change institutions, and 19% said they would change institutions. These percentages were significantly different overall ($\chi^2=62.2$, 2 df, $p<.0001$) as well as from one another when each possible pairing was compared (all χ^2 results significant with Holm-Bonferroni adjustment to control for error rate).

We presented a scenario to keepers in which their institution was asked to breed a species that may see its offspring subjected to population management euthanasia. We asked whether keepers would prefer having a discussion with staff regarding the reasons for PME before accepting the breeding recommendation. The vast majority of responders (94%) indicated they would prefer having a conversation prior to breeding.

At two points in the survey, we solicited more detailed feedback from responders. In one question, we asked keepers to provide an example of a scenario in which it would be acceptable to use PME on an animal. In the same question we asked those who were totally opposed to PME to tell us why. We obtained 372 answers to this question. Approximately



62% of responders could provide a scenario in which they would consider PME acceptable while 38% clearly did not support PME; this difference was significant ($\chi^2=21.3$, 1 df, $p<.0001$). We generally categorized the acceptable scenarios into situations of: surplus individuals, space constraints, animals with behavioral issues, quality of life concerns, post-reproductive individuals, PME to maintain genetic diversity and eliminate hybridization and inbreeding, managing large egg masses, breeding animals to protect their fertility, and animals that are managed as colonies. Of these, surplus individuals, behavioral issues, and spatial constraints were the most reported types of scenarios.

For those that were clearly opposed to PME, their reasons could generally be categorized as follows: there are other management options, we have responsibilities to the animals we produce, space could be found somewhere, fear of public perceptions, feeling that PME was “the easy way out”, sentiment that surplus animals should not be treated differently from non-surplus animals, and sentiment that we should manage fewer species in zoos. Of these, the belief that there are other management tools available and we have responsibilities to care for animals were the most commonly reported reasons.

Another question asked what kind(s) of information responders would find useful to learn more about PME. Again we could generally categorize the responses as follows: “the proof” related to PME [Do we really need PME? Does PME really help populations/individuals? What do we know about the negative impacts of non-breeding or contraception? How do animals, staff, and the public handle PME?, etc.], examples of thoughtful decision-making processes for PME at the individual and population level, statistics on how, when, and where it is used, and what effects it has had on animals, staff, zoo visitors, and the general public, more data about our populations and their status, contraceptive challenges, feedback from institutions and keepers that are involved with PME, talking points for communicating to the public, position papers and policies from the zoo industry, and the results of this survey! Finally, many responders wanted any and all information they could get and more open discussion. The good news is that some of this information is already available, though it may be difficult to access (e.g. AZA membership is required to download studbooks, breeding plans, and policies) and more of it is being produced (see Suggested Reading at the end of this paper). See Powell (2015, this issue) for a summary of feedback from a small sample of European zoo keepers that are involved with PME. Other data will take some time to generate until we

Table 1: Knowledge and awareness of euthanasia among keepers

Are you aware of the euthanasia policy at your institution?

Yes	78%
No	8%
Unsure	14%

Have you heard of population management euthanasia prior to completing this survey?

Yes I have heard of it before	93%
No this is the first time I'm hearing of it	6%
No answer provided	1%

Are you aware that some institutions in Europe and Australia practice population management euthanasia?

Yes I am aware	79%
I am somewhat aware	9%
No I am not aware	12%

Are you aware of instances of population management euthanasia at your institution?

Yes	51%
No	43%
Unsure	6%

can draw firm conclusions and PME may have to be implemented to test some of these ideas and concerns.

Discussion

We conclude that U.S. zoo keepers are already quite familiar with the terminology of PME and just over half (though these represent an unknown number of institutions because we didn't require responders to tell us where they worked) are familiar with it through direct or indirect experience at their current institutions. We were somewhat surprised to find the majority of keepers could think of a scenario when PME would be appropriate. Results from the open-ended questions suggest that there is still much keepers would like to know about PME and how it might be implemented, even though it might not ultimately change their minds about the practice. We suspect that this information gap is partly why a relatively large percentage of responders (56%) reported that they either might consider or definitely would leave their job if PME was implemented at their current institution. The survey does give us clear guidance on how to design awareness, education, and training programs for keepers and other zoo staff should PME be necessary at an institution. Likewise, the survey hopefully provides insights for continued discussion among animal care professionals.

Acknowledgments

We would like to thank the Wildlife Conservation Society and the Sacramento Zoo for providing time to work on this project.

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AZA Wildlife Contraception Center: <http://www.stlzo.org/animals/scienceresearch/contraceptioncenter/> This website discusses contraception options, risks, and side effects for various taxa.

EAZA (European Association of Zoos & Aquariums) Statement on Euthanasia: <http://www.eaza.net/about/Documents/EAZA%20Euthanasia%20statement.pdf> This is the statement adopted by EAZA outlining its philosophical position on euthanasia.

Penfold, L., Powell, D., Traylor-Holzer, K., and C. Asa. 2014. “Use it or lose it”: Characterization, implications, and mitigation of female infertility in captive wildlife. *Zoo Biology* 33:20-28. This paper reviews literature on the effects of NOT breeding animals on their fertility and discusses the challenges involved in mitigating these risks. 🐘

Humane Euthanasia of Animals for Population Management:

Perspectives from a sample of European zoo keepers

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This report addresses a request from U.S. zoo keepers to get perspectives of keepers who are involved in or exposed to population management euthanasia at their institutions

In early 2014 I ran a survey of U.S. zoo keeper attitudes regarding humane euthanasia of zoo and aquarium animals for population management, which I will refer to as population management euthanasia (PME) for brevity. I reported previously (Powell & Ardaiole, in press) that one of the questions on the survey asked what kinds of information zoo keepers would find useful for learning more about PME. One common answer to the question was that U.S. zoo keepers would like to hear from keepers who are involved in or are exposed to PME at their institutions.

During the summer of 2014 I attended an international meeting of zoo professionals and took the opportunity to solicit some European zoos to answer a short keeper survey about their experiences with and perspectives on PME as well as their advice for other keepers that might be exposed to it. I indicated that U.S. zoo keepers were interested in hearing about the experiences of keepers from places where PME was practiced. I was able to get permission from four European zoos to survey a few of their keepers. The four zoos were in Germany, Denmark, the Netherlands, and Britain, and I agreed to allow them and their staff to remain anonymous. My goal was to try and select a sample of zoos that spanned different countries and practiced PME to some extent. I also asked the curators or directors that I met to give the survey to a few of their keepers who were exposed to PME. I did not have any other control over whom they chose to give the surveys to, so in that sense, this sample could be biased towards keepers that may be generally supportive of the practice, especially since they may have answered the survey in their native language and then given the survey to a manager to translate for me. My hope was that 1) the keepers completing the survey would feel free to answer any way they chose because the managers at their institutions that I spoke to seemed frank and honest about their practices and willing to participate and 2) the keepers would want to be open with their U.S. counterparts. Regardless of the fact that the sample might have been biased,

after reading the responses, I felt what the European keepers had to say would be interesting and perhaps helpful for U.S. zoo keepers nonetheless.

The sample consisted of three keepers each from Germany, the Netherlands, and Britain and two keepers from Denmark. The survey consisted of ten questions. I took all the answers to each question and put them all together on a single page without labeling which country they were from. As their answers are summarized below, I'll talk about their answers in terms of overall view/perspective/sentiment and then add in direct quotes where appropriate to support these characterizations. When a keeper presented a dissenting view or opinion, I made sure to include that in the discussion of each question below. If you would like the full text of all of the answers to the surveys, please contact me.

The keepers that completed the survey had worked in zoos anywhere from one to 30 years with a variety of mammals and some birds. One keeper cared for reptiles and amphibians. Many of them had worked with hoofstock species and a couple had significant experience with domesticated animals and other zoo species (e.g. caviars) that were routinely culled and fed out to zoo carnivores.

When asked about how managers prepare keepers for PME events, in nearly every case keepers were involved in discussions about upcoming PME events. Two keepers reported that it is often keepers at their zoo who are the ones to bring the need to cull an animal to the attention of veterinarians and managers. The content of discussions varied somewhat but generally included information about the individual animal that was to be culled, the status of the population of that species, what the alternatives were and how those might affect the animal and/or the population, and keepers had opportunities to voice their opinions and ask questions. Approvals for PME varied and sometimes came from



head keepers, collection managers, curators, directors, and/or veterinarians and sometimes even studbook keepers. Discussions took place in formal meetings or in casual conversations and one-on-one interactions. The exceptions to this general rule were species that were routinely culled as part of feeding programs for other zoo animals (e.g. domestic rabbits). There were not discussions prior to those PME events as they were standard operating practices. One keeper mentioned that the issue was discussed during his/her job interview at the institution.

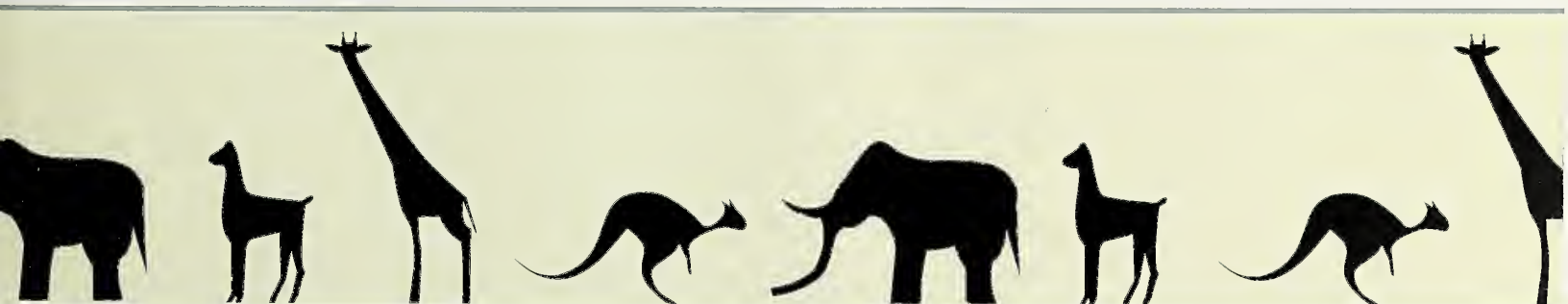
Next, we asked keepers to describe the decision making process for PME at their institution as they understood it. Virtually all keepers reported that decisions involved determining whether or not there were suitable homes/enclosures for the individual(s) in question, either at the zoo or at another facility, and what the “quality” of those homes would be. For example, would an individual of a herd-living species have to live alone if it was maintained at the zoo where it was born or elsewhere? Curators, collection managers, and studbook keepers were reported as responsible parties for making these inquiries. Many also reported that staff would investigate whether the individual animal(s) could be maintained in the social group either on contraception or permanently sterilized and what the potential ramifications of that would be. Keepers would provide feedback on these kinds of questions. Whether or not the animal could be used as food for other collection animals was also mentioned as a factor. Only one keeper mentioned that a decision tree-type method was used. Another keeper described their zoo’s process as follows:

“Any animal that could possibly be euthanized is first allowed to reach dispersal age in order to reduce any stress to the mother. If the animal is not needed for the breeding program then the structure of the current group and housing will be considered, such as whether it is possible to contracept or castrate the individual in question and leave it in the group, or if there is space to house a separate group elsewhere within the zoo, i.e. a bachelor herd. If none of the options are possible then the animal will be put on the surplus list for three months to ensure there are no other collections that want it before we will euthanize it. An ethical review is also carried out to ensure all options have been covered and the choice to euthanize is in the best interest of the individual involved and the rest of the group.”

“Ethical reviews” and “quality of life reviews” were also mentioned by a second keeper. It appeared that “ethical reviews” were more common and relatively quick, whereas more in-depth “quality of life reviews” were undertaken when keepers or the public were likely to have a difficult time with a particular animal, particularly iconic species, being culled. Details of these reviews were not provided. One keeper indicated that at their zoo they use “natural behavior” to decide when it is time to bring an animal up for culling (e.g. when it is reaching the age of independence or the parents begin to push it out of the group).

The keepers I surveyed were nearly unanimous in mentioning maintenance of natural behavior and the “enrichment” provided by living in natural social groups, breeding, and rearing young when I asked them what benefits they felt animals in a breed and cull management program experienced and what the keepers liked about this kind of program. They believed this management approach prevents behavioral abnormalities and is more interesting and educational for guests who see the animals mating and rearing young. They also felt this practice avoids any health risks that contraception might be associated with. Keepers felt that not allowing animals to breed may affect their psychological health because it’s a highly motivated behavior and may make it difficult for them to breed later in life. They emphasized that it was important for females to rear their young to the age of independence and that this strategy eliminated the need for breeding males to live alone. One keeper did feel this management strategy rarely benefited animals directly but was beneficial for genetic health of the population. He/she went on to say that for some animals this strategy alleviated the need to maintain individuals no longer needed for breeding in unnatural social groupings or alone, which could be stressful to the animal. One keeper remarked that removal of offspring is all right for the parents because it is done at a time when the parents are ready.

I asked whether it was emotionally difficult when animals they took care of were culled and if so, how keepers dealt with it. The keepers provided a variety of answers. One keeper reported that his/her farm background helped in making PME not an emotional issue. Another reported that the fact that their animals get to live more natural lives made it okay for the keeper. Keepers said that looking at the bigger picture, knowing that “it is necessary for having a healthy population of zoo animals”, and knowing why PME was being used made it easier to cope with. Two keepers indicated that PME is difficult to accept sometimes depending on the species and how attached keepers get to the animals. One said that, “so many animals come and go, I find it important to bear that in mind to help me prepare myself for any animal’s departure, through death or transfer”. Another keeper responded that PME is difficult to handle, “however as I have witnessed more culling and gained more information about why these decisions have to be made and sometimes why that particular individual has to be culled, it has become slightly more understandable. Decisions are rarely made lightly and, in general, no one is 100% comfortable to be taking the life of an animal that is known and has become a character. Within my section, there are few restrictions on voicing opinion or showing emotion which personally helps me as it means I can get upset in front of colleagues as well as in private, helping me to cope with some of the culling”. Another keeper said it is just a part of their job but that when the day comes for an animal to be culled, a keeper can say they don’t feel up to it that day and someone else steps in to assist with the procedure and everyone is accepting of that.



When asked how keepers manage their attachment to the animals that they know might be culled, their answers varied. Some indicated that they do not allow themselves to become attached, avoiding giving the animal a name and unnecessary touching of the animals, even though they continue to provide excellent care to the animals. Others said attachment happens anyway, but knowing the possible fate of the animal in advance helps as well as knowing why it might be culled and that its welfare and that of the species is being considered. Others said they remained professional and maintained a high standard of care for all of their animals regardless of the animals' future. Another interesting answer was:

"Any animals which I have formed a bond with I find it best to continue to work around them in the same way and feel the same way about them in order to help myself, as well as the animal, retain some normality. This does not make it any easier when the animal is culled and sometimes it has made it more emotionally difficult but I would find it more difficult to change my attachment to an animal due to a decision that has not been made directly by myself."

The next question asked how keepers would feel if other population management tools like contraception or separating the sexes were used instead of culling. Keepers expressed concerns about how these practices would alter or eliminate natural behavior and expose animals to other "risks" (e.g. contraceptive side effects, living in unnatural social groupings or alone). But several keepers did also mention taking a balanced view and that these kinds of management tools may be appropriate in some circumstances. For example, solitary species would be fine if housed alone. They also mentioned that these tools were more often used for highly social, intelligent species like great apes and elephants because culling individuals of these species would likely have a more dramatic impact on the other animals in the group, as well as the staff and public. One keeper felt that the choice of management tool would depend on whether all offspring produced are considered surplus or some were genetically valuable. In the latter scenario, he/she would prefer a breed and cull management program.

I followed up by asking what these keepers felt were the disadvantages of the breed and cull management strategy. Most keepers saw no disadvantages or drawbacks but some acknowledged there can be emotional difficulties for keepers or the public. One remarked "as a keeper the last thing you want to do is euthanize a healthy animal. But if everything has been done and considered (transferring, replacing, castrating/sterilizing, etc.), culling in the end will be a wise solution for a bright future of healthy animals in our zoos/facilities". Another keeper acknowledged that culling can be difficult for some animals to cope with and admitted that the practice sometimes raises ethical questions.

The next question asked whether keepers have a harder time with culling of certain kinds of animals and which animals were the most difficult to handle. Most keepers reported that it is more difficult to handle the culling of some kinds of animals. The reasons given included: the intelligence and sociality of the animals, whether it was generally considered a "prey" animal or not, the amount of time they have worked with an animal, the "charisma" of the animal (e.g. larger mammals, carnivores, apes), and the reason for the cull of that particular animal. One interesting observation from a keeper was that sometimes maneuvering and processing large animal carcasses after culling


is emotionally difficult because the animal's body may be in unnatural positions, it may be tied up, or large equipment may be used to push or pull the animal around. This keeper felt it was hard to be respectful to the animal in these situations. He/she also mentioned that in some cases the necessity of separating an animal from its social group or shifting it into a novel space to be culled adds stress for the animal and staff and contributes to making the procedure difficult for keepers.

The final question asked whether these keepers had any advice or information they'd want to pass along to U.S. zoo keepers about this practice or how keepers experience it. Their answers included a lot of information. One sentiment was that keepers should keep natural "conditions" in mind and try to design the lives of captive animals as close to nature as possible, while ensuring that the animal receives the best possible care during its life. Another keeper also mentioned remembering that you [the keeper] gave the animal the best possible care during its life. One keeper urged colleagues to not hide from "population problems" and to try and see the bigger picture and make difficult decisions so animals don't end up in situations where their welfare might be at risk. Another keeper also emphasized discussing animal population management openly with staff – and the public – and providing opportunities for everyone to voice opinions as well as being diligent in minimizing the number of animals that must be culled. Another responder urged keepers to look at PME practically and to acknowledge that though a keeper may not like it, it generally is [in this responder's view] for the good of the species and the welfare of the individual being culled. He/she urged keepers to focus on all the good parts of their job, as these he/she felt, outweigh the negative events. Another keeper urged others not to worry about voicing opinions and asking questions but also not to judge others who have different ethical views, suggesting that keepers try to provide emotional support for one another. This keeper also emphasized thinking of the bigger picture and remembering the animals are being culled to protect the species as a whole.

Conclusion

After reviewing these surveys, I felt like the following generalizations could be made. European zoo keepers involved in PME care very much about the individual animals and populations of species they take care of. They feel strongly that "natural lives" are of paramount importance to their animals and are concerned about any practices that would alter natural behavior, physiology, or other processes. It is also important to realize that PME isn't the only tool used in European zoos; it is used alongside tools like contraception. It seems important to everyone involved that there are ample opportunities for discussion, information sharing, and voicing opinions – and sometimes emotions. With knowledge about PME possibilities for animals they care for, these keepers take a variety of tactics and adopt various mindsets to help them adjust to the management practice. One common formula appears to be thinking about the bigger picture, remembering the larger population of the species and what its needs are, and celebrating the good parts of the zoo keeping job, including providing excellent care every day to animals.

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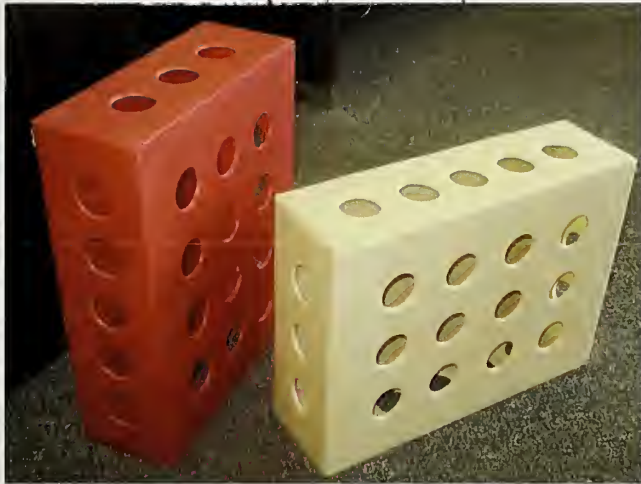
Powell, D. and M. Ardaiole. (2015). Nationwide Survey of Keeper Attitudes and Knowledge Regarding Population Management Euthanasia: Initial Results. *Animal Keeper's Forum* 42(3):74-75 

Wildlife Toy Box

Enrichment can be defined as:

“...a process for improving or enhancing animal environments and care within the context of their inhabitants’ behavioral biology and natural history.

It is a dynamic process in which changes to structures and husbandry practices are made with the goal of increasing behavioral choices available to animals and drawing out their species-appropriate behaviors and abilities, thus enhancing animal welfare (AZA/BAG 1999).



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Training a Snow Leopard for Voluntary Radiographs as a Pregnancy Management Tool Using Positive Reinforcement

Sarah Kirkman • Wild Animal Keeper III
Akron Zoological Park • Akron, Ohio

INTRODUCTION

There are several methods to confirm pregnancy in felids including ultrasound, and hormonal studies such as fecal and blood testing; however these tools do not provide an exact count of the fetuses *in utero*. Knowing a confirmed count of expected cubs can improve decisions made during parturition. This includes when and if medical intervention may be necessary due to the time between expected cubs or other complications.

Abdominal radiographs can provide an image of the entire uterus and an accurate count of fetuses. However, radiographs are generally performed under anesthesia, which carries a health risk to both the adult and any unborn fetuses.

Pregnancy management plans play a significant role in the success of a breeding program. Developing techniques to improve these plans can positively impact breeding populations such as

those within a Species Survival Plan®. Operant conditioning has been used to train a wide range of behaviors, which are highly beneficial when integrated into a pregnancy management plan. The goal of this project was to use positive reinforcement to train a pregnant snow leopard for voluntary radiographs in order to confirm a fetus count. Obtaining radiographs without the use of anesthesia would avoid the potential health risk and stress associated with chemical immobilization.

MATERIALS AND METHODS

Subject History

At the start of this project the female snow leopard involved was 5.5 years of age and had been housed at Akron Zoological Park for approximately 4.5 years. She had one previous litter of cubs born in May 2012. The Akron Zoological Park received another breeding recommendation from the Association of Zoos and Aquariums (AZA) Species Survival Plan® in 2013 to breed her with the same sire of the previous cubs. She was housed with the male snow leopard and breeding was observed January 7-9, 2014.

Multiple husbandry and medical behaviors, including abdominal ultrasound for her previous pregnancy, were trained with operant conditioning while at Akron Zoological Park. The squeeze chute in holding, where training would take place for voluntary radiographs, was the same squeeze chute where the voluntary ultrasounds were performed. Raw beef (roast), chicken breast, and Nebraska





Figure 1: The protective case for the x-ray plate.

Brand® meat were the primary reinforcers used during training sessions.

Squeeze Chute Description

Training took place in a squeeze chute connecting two indoor holding areas in the building where the snow leopards are housed. The chute measures 70 (L) x 40 (H) x 32 (W) inches with a movable row of bars inside the length of the chute, which can narrow the area to create a squeeze. A solid shift door on the left and right sides can enclose an animal in the chute. For the radiograph training the moveable set of bars was moved to the very back of the chute to make it as wide as possible. The left solid shift door was down and the right shift door was up so the snow leopard still had access to a holding and could leave the chute by choice.

The fourth piece had a screw at each end that fit into notches on the top and bottom pieces and was secured to the case with wing nuts (Figure 1).

X-ray Unit and Plates

The portable x-ray machine used during this project was a MinXray® HF100+ ultra light. The digital x-ray plates were Agfa® CR MD4.0T General Cassettes, which measured 17 x 14 inches. The x-ray plate was placed inside the protective case and the case was attached to the row of bars at the back of the chute by heavy-duty zip ties. There was approximately 29 inches between the x-ray unit and the plate. The plate was 7 ¼ inches off the ground at the beginning of the project and was raised to 12 ½ inches from the ground after elevating the snow leopard's front feet.



Figure 2: The extra training tool used to simulate the x-ray case.

The goal of this project was to use positive reinforcement to train a pregnant snow leopard for voluntary radiographs in order to confirm a fetus count.



Figure 3: The initial set up of the chute.

The front bars of the chute are spaced 1½ inches apart and can be locked in place, set at adjusted heights, or completely removed. For this project, one bar was lifted which created a 3¾ inch gap, allowing enough space for the x-ray head to sit flush with the bars when the unit was in position.

Protective Case

A protective case for the x-ray plate was designed and built in-house by the facilities staff at Akron Zoological Park. The case measured 19 ½ (L) x 16 ½ (H) x 1 ¾ (W) inches. The case had four sides made from ¾-inch plastic lumber pieces that were sandwiched between the front and back pieces made from ½-inch plexiglass and secured by four screws on three sides. The plastic lumber piece on the fourth side was removable to allow for easy insertion and removal of the plate.

Training Plan

A behavior plan was created to list out successive approximations that would be used to shape the radiograph behavior. The end goal was to have the female snow leopard enter the squeeze chute, position the right side of her body against the back of the chute so her abdomen was in front of the x-ray plate and stand still while the radiograph was taken. Scanning, targeting, and environmental manipulation were the shaping techniques applied during the training.

Training began 18 days after the first day of observed breeding with multiple sessions per week. Shaping the behavior was limited to the two primary snow leopard keepers. Like many training projects, the behavior plan was modified based on progress and challenges. Initially a PVC pipe was set through the squeeze chute as a chest target to help with positioning the snow leopard in the chute.



Figure 4: The first radiograph image showing an obstructed view due to the female's femur.

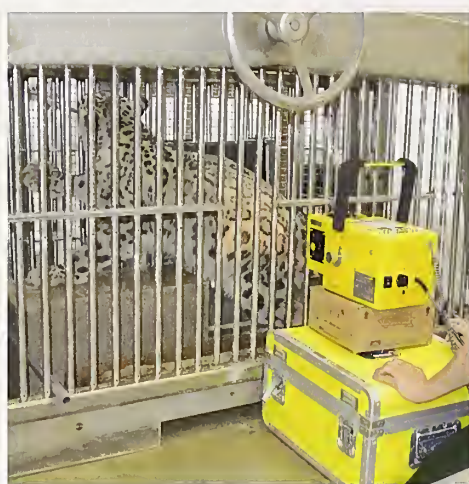


Figure 5: The snow leopard being reinforced after the radiograph was taken.



Figure 6: The final radiograph revealing two fetuses.

Two logs were also added to the squeeze chute to create a narrower space for the snow leopard to stand in (Figure 3).

In addition to the target and environmental manipulation, it was decided shaping a lean behavior would be beneficial. The goal was for her to stand parallel to the mesh then press her right shoulder into the mesh when given the verbal cue "lean". This would bring her entire right side closer to the mesh and decrease the space between her abdomen and the x-ray plate. To shape the lean behavior in different locations other than the squeeze chute, an additional training device was made to simulate the x-ray case (Figure 2). This was created from 3/4-inch plexiglass measuring 12 x 12 inches. Two posts attached to the back, 12 inches (L) x 1 inch (H) x 1 inch (W), allowed for easy placement in various locations.

Success with shaping the lean behavior increased after switching from targeting to scanning. We did not have much progress using a shoulder target, but noticed she offered the lean in behavior often as she

would rub on the mesh after chuffing at her keepers. We were able to capture the behavior and pair it with a cue. After six weeks of training, the female snow leopard was consistently responding to the verbal cue "lean".

Once her abdomen was positioned correctly, she was cued to lean with her right shoulder pressed against the mesh with the plexiglass piece positioned at her abdomen. She held position about two seconds, which was long enough for the x-ray to be taken, and then she was bridged and reinforced. The final few approximations included the x-ray unit being placed in front of the chute, turning the x-ray light on, lifting a chute bar and having a vet staff member positioned at the x-ray unit.

Pregnancy was confirmed via a voluntary abdominal ultrasound performed at 44 days from the first day of breeding. The first voluntary radiograph was taken on day 78, which was two months from the start of training. Four separate sessions

were carried out over the next 10 days producing a total of eight radiographs. The x-ray settings used in the first session were based on the settings used for her 2012 pregnancy while the animal was under anesthesia. Future session settings were adjusted depending on the image results.

The images from the first session revealed one of the female snow leopard's femurs was potentially obstructing the view of the fetuses (Figure 4).

To improve the view, a plastic enrichment box, held in place by two logs, was set into the squeeze chute to elevate the snow leopard's front feet approximately 12 inches. With her rear feet remaining on the ground this position provided a clear image of the fetuses. The x-ray case and unit were also raised accordingly. This set-up was used for the last three sessions (Figure 5).

The end behavior was as follows:

- ▶ Snow leopard enters the chute
- ▶ Stands with her front feet on the box
- ▶ Her abdomen is positioned in front of the x-ray case
- ▶ A verbal "lean" cue is given to move her closer to the mesh and x-ray plate
- ▶ Once holding that position, a radiograph is taken

DISCUSSION

Along with the challenges encountered during the shaping process, there were also challenges determining the best x-ray settings. Adjustments to the settings were made through trial and error. The plexiglass over the plate and the distance between the animal and the plate were

Table 1. The x-ray settings used in each session.

Date	# of Radiographs	KVP	MAS
3/25/14	2	74	4.0
4/1/14	2	94	4.0
4/2/14	1	90	6.0
4/4/14	3	84	10.0

the two main differences between the voluntary radiographs and those taken under anesthesia during the previous pregnancy. While standing, the female snow leopard's abdomen was close to the plate but it was not the same as if she were lying with direct contact on the plate. The plexiglass over the plate caused striations to be visible on the radiograph images. It also influenced the power settings necessary to obtain an image with good contrast between soft and boney tissues. Although the voluntary radiograph images obtained had less detail than previous images taken under anesthesia, the final radiograph on day 88 revealed a successful image of two fetuses (Figure 6).

On April 14, 2014 the female snow leopard gave birth to 1.1 healthy snow leopard cubs. The staff knew parturition was complete after the second cub due to the information gained with the radiographs. The goal of this project to use positive reinforcement to train a pregnant snow leopard for voluntary radiographs in order to confirm a fetus count was achieved. This proved to be a valuable behavior and provided Akron Zoological Park with an innovative pregnancy management tool. Advancements to pregnancy management plans can enhance animal care, provide

information that may help with addressing complications during labor, and potentially increase birth success rates.

This paper was presented at the 2014 Felid TAG Meeting in Front Royal, Virginia.

Photo credits are given to Sarah Kirkman and David Barnhardt

ACKNOWLEDGEMENTS

Special thanks to those who supported and assisted in the successful design, development, and troubleshooting that went along with this project including Kimberly Cook DVM, Shane Good, Stephanie Miner, Rose Roulette, Anthony Law Jr., plus other members of the facilities, veterinary and animal care staff at Akron Zoological Park. 🐾



BHC Comments by Kim Kezer:

Operant conditioning has become an everyday part of our jobs as zoo keepers. With a little bit of time, detailed planning, creative use of resources around the zoo and utilizing a variety of training methods, we can train animals to allow minimally invasive procedures to occur without the use of restraint or anesthesia. It is easy to be discouraged due to limited time or money to set up the "perfect" training area. If you are able to find 10-15 minutes twice a week to train an animal, over time you will see results. To create those desired training areas on a tight budget, use logs and pieces of scrap wood, cinder blocks, feed tubs, enrichment items or scraps of PVC pipe to modify the animal's training area to achieve the results you need.

Multiple methods of behavioral conditioning can be used to achieve desired behaviors. In addition to shaping through successive approximations, this paper mentions the use of scanning to train the "lean in" behavior. For those not familiar with scanning for a behavior, here is a bit more information on the topic. Scanning is sometimes referred to as "capturing". A trainer can "scan" for or "capture" a behavior by observing an animal and waiting for it to perform a desired behavior or movement. In this case, to shape the "Lean In" behavior, the snow leopard was conditioned to step up onto the block, but her body was still too far away from the mesh. Once in this position, the trainers watched the animal and once she leaned however slightly towards the mesh, the animal was bridged at the exact moment she began to lean her shoulder towards the mesh. Gradually, the criteria increased until she was moving her shoulder to the mesh. Using scanning is a great way to put "natural" behaviors, for example a tiger scratching on a log, under stimulus control.

Congratulations on the successful birth of Akron Zoological Park's two snow leopard cubs as seen in the pre-parturition x-rays and as always thank you for sharing your Training Tale!

Enrichments for Captive Andean Condor (*Vultur gryphus*) in Zuleta, North Ecuador

Yann Potaufeu

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All pictures © Yann Potaufeu/Galo Plaza Lasso Foundation

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Introduction

Over recent decades, enrichment has been shown to be an important component for the well-being of animals in captivity. The AZA (Association of Zoos and Aquariums) Behavior Scientific Advisory Group defines enrichment as “a dynamic process for enhancing animal environments within the context of the animals’ behavioral biology and natural history. Environmental changes are made with the goal of increasing the animal’s behavioral choices and drawing out their species-appropriate behaviors, thus enhancing animal welfare”¹. In practice, this consists of providing stimulating and/or challenging elements for an animal in order to keep it physically and mentally fit, and to avoid abnormal behaviors that occur due to captivity.

The Galo Plaza Lasso Foundation (GPLF) is a NGO involved in conservation, education and social development in Zuleta, a community situated in the Imbabura province of the northern Ecuadorian Andes. Among its activities is the Condor Huasi Project, a rescue and breeding program for Andean Condors (*Vultur gryphus*). The GPLF is in charge of seven adult condors. Six of these birds were rescued, whilst one female was born in captivity. They are divided in four enclosures, as shown by Table 1.

In 2013, an effort was made to experiment and find enrichments for the condors. Different environmental (stimulation) and feeding (challenge) enrichments were tried. This article documents our ideas,

successes and failures, showing methods that could be used by other centers or zoos, and could provide inspiration for developing new ideas for captive condors and vultures in general.

The enrichment plan was part of a more general behavior study. Observations for this study usually took place between 10:00 and 15:00. Some time-data will be presented in this paper but because it was not always possible to record precise times for all cages over the same period, no statistical analysis has been carried out. Our conclusions are therefore also based on direct observations and our perception of the impact of the enrichments.

Implementation and Results FEEDING ENRICHMENTS

► Variety of food

Increasing diversity in the type of food provided is an important part of enrichment. Because of GPLF’s location within an agricultural area, we are able to provide a variety of types of meat. The Zuleta condors are fed mostly on cow (adult and calf) but they are also given sheep, llama, rabbit or even trout with good success. However, for a reason not understood, none of them seems to like horse meat. Every attempt to introduce it proved fruitless, as the meat wasn’t touched at all.

► Meat with pelt

The best way to keep the condors working on their food as they would do in the wild is to give them whole dead animals or pieces

of meat with the skin still attached (Fig.1). Condors in Zuleta are sometimes given whole rabbits that are bred by the GPLF for this purpose. Pieces of calf or sheep with the skin still attached, legs, or heads can also easily be given.

► Live trout

The Hacienda Zuleta, where the Condor Huasi project is located, breeds trout. Each condor enclosure contains a pond, and so live trout were experimentally introduced to see how the condors would react.

All condors showed interest in the live trout and interacted with them though the males generally showed more enthusiasm and put more effort into attempts to catch them. Reina Pacha and Tarishka were both observed trying to catch the fish for close to 15 minutes. (Fig.2)

It is important for the efficiency of the enrichment that the fish are still lively and hard to catch; this ensures the condors will spend more time on the activity. Even after getting caught, a lively fish may struggle and manage to escape back into the pond, making the enrichment more effective.

► Hung meat

This enrichment consists of hanging the pieces of meat from a structure in the enclosure, such as a perch or the wire netting. Two kinds of material were used: rope (Fig.3) or rubber band. The latter option provides more elasticity and the birds can pull on it harder, but the band has to be strong and thick enough not to break and be ingested. Although hung, the

¹ <https://www.aza.org/enrichment/>



Fig.1: Reina Pacha feeding on a whole rabbit.



Fig.2: Tarishka catching a live trout.



Fig.3: Intl working on meat hanging from a perch



Fig.4: Pimampiro finding meat within the box.



Fig.5: Rucu going for meat in the traffic cone



Fig.6: Tarishka trying to get the meat from under branches.



Fig.7: Reina Pacha in the pond.



Fig.8: Coconut hung in enclosure.



Fig.9: Pimampiro lifting a rope ball.



Fig.10: Ayu interacting with plastic ball

meat touches the ground so the condors can also use their feet and eat in a more natural way if they choose to.

This is by far our most efficient feeding enrichment. It works very well for all of our condors. Coya has been registered working on the meat for more than 30 minutes. The only unsuccessful trials were when the meat wasn't attached strongly enough and the birds could remove the meat from the rope or the rubber band too quickly.

Depending on the level of bond and hierarchy in the pair, two of these enrichments can be put in different places in the enclosure, or two pieces of meat can be attached to the same rope and both individuals can work on it together.

► Meat in box

The food is put in a cardboard box with one or several holes in it (Fig.4). The holes must be big enough to prevent the condors from having their head stuck, but small enough to ensure that getting the meat out stays challenging.

There are two phases. First, the box by itself is enrichment, being a source of curiosity and apprehension, especially when the condors make it move. Once they realize there is food in the box, the challenge of getting it begins. After the condors get the food out, the cardboard remains a source of enrichment. Several times the box was found destroyed the next day.

This enrichment has been successful with all of the Zuleta condors except for one couple, Ayu and Inti. Except for one time, when Ayu picked at the box for six minutes to try and get the meat out, all the attempts at introducing this enrichment have failed. The meat was found still in the box and untouched. Among the other condors, Pimampiro has been observed spending 45 minutes getting the meat out, and Rucu was observed pulling the box throughout the cage to get it.

However, if there is a dominant individual within the pair, it is better to put two of these enrichments in the cage. In the case of our couple 1, Reina Pacha often just had to eat after Rucu pulled the meat out of the box.

► Meat in traffic cone

Meat is put in a traffic cone. Unlike with the cardboard box, getting the food is not physically complicated. The challenge is more mental as the condors have to find out that the meat is inside the cone and

then have to dare to approach it and put their head in it.

This enrichment has little success. At its best, it kept Rucu and Coya busy between two and three minutes before they got the meat out. In other cases, the meat was taken out in under a minute or the condors didn't even approach it. The cone can be left in the cage and used as an environmental enrichment (See environmental enrichments, Fig.13).

► Meat under branches or stones

The meat is put under a pile of branches (from which all the spikes and potentially dangerous growths were removed) or stones (Fig.6).

This enrichment didn't work well because the birds get the meat very quickly, destroying the whole pile instead of working on it as it was hoped they would do, or because they eventually gave up (e.g. Tarishka who spent four minutes walking around the pile and interacting with one stick but finally left without the piece of meat). It was even easier for the birds to get the meat under the stones.

► Meat in ice

Meat is presented in a block of ice the condors are supposed to work on, in order to break it and get the food. All the birds initially reacted positively to this enrichment, being curious and picking at it. But only Rucu and Ayu were keen on breaking the meat out (Ayu spent 40 minutes on this task). The others usually gave up after less than five minutes.

ENVIRONMENTAL ENRICHMENTS

► Pond

Each enclosure contains a 1.5 m diameter pond, with a water depth of about 15 cm (Fig.7). The main purpose is not for the birds to drink as, like most raptors, Andean condors don't drink much, but for them to bathe. Even though bathing doesn't occur often (it was reported occurring on three to six days within a month), it seems to have an important social aspect for the birds, both between and inside the enclosures.

Two interesting observations were made. The first is that "bath stimulation" occurs between the condors. One condor starts bathing and then, after a few minutes, condors in all enclosures do the same. Very often the bathing times were reported on the same day for all condors and during the same period. The bath sessions (including some breaks to preen, rest or dry before going back in the pond) lasted up to one hour.

The second observation occurs between mated pairs within a single enclosure. Usually both condors are at the pond: one is in it while the other stands on the edge. Then they switch places and repeat this behavior several times. During this interaction the pairs are very close and exchange physical contacts. Even Reina Pacha and Rucu, who are not a particularly compatible pair, spend those moments together without aggression.

Just as a successful enrichment should, a pond allows the condors to present a wider range of natural behavior, as well as social interaction, and should be present in any condor enclosure.

► Hung objects

In view of the success of the hung meat enrichment, environmental enrichments following the same principle were introduced. Three different objects were proposed: coconut (Fig.8), rope ball and colorful plastic ball. Condors interact in three ways with this kind of enrichment:

- Pulling on the extremity of the rope or the rubber band.
- Lifting it from above (Fig.9)
- Picking at it with their beak, making the object swing (Fig.10).

There was similar interaction with the coconut and the rope-ball, with individual differences in interaction between the condors. Ayu and Inti (couple 3) were the most playful. They often interacted with the enrichment more than five minutes and sometimes up to 25 minutes. The lone male, Pimampiro, was also inclined to interact with this kind of enrichment, sometimes for 15 minutes at a time. Within the two other couples, an obvious difference exists between males and females. The males (Rucu and Tarishka) interacted with the objects but often for less than five minutes, while the females (Reina Pacha and Coya) were almost never seen playing with it. Reina Pacha was the least interested of our condors in this type of enrichment.

There was a different pattern of interaction with the plastic ball. Only Ayu and Inti interacted with it, but they loved it! They were observed playing with it for 50 minutes each and it is highly likely that they continued after observers left, as the ball was found destroyed the following day. The hollow ball was attached to a rubber band, giving more elasticity than a rope. This can be done only with very light objects as the condors like to pull on it and finally



Fig.11: Pimampiro interacting with a small basketball



Fig.12: Pimampiro interacting with a small basketball



Fig.13: Rucu interacting with traffic cone.



Fig. 14: Inti interacting with old leaf stuck on wire netting

let it go, and a heavier object may cause injury to them.

This enrichment has been the most successful one for Ayu and Inti, but the ball wasn't strong enough to withstand rough treatment, and they managed to take a grip in the small hole made to pass the rubber band through. Another kind of material should be used in the future.

► Same objects on the ground

Rope-balls and coconuts were also sometimes put directly on the ground. This proved unsuccessful. Reina Pacha, Rucu and Coya never touched the objects, whilst Tarishka, Ayu and Pimampiro sometimes interacted with one but for no longer than a minute. Only Inti found the objects interesting and picked at them for between two and seven minutes. The most successful trials were when the objects were placed on their feeding platform. The birds interacted with them until they made them fall on the ground and then neglected them.

► Small colorful basketball

A small, colorful basketball was introduced into the enclosures. As the land is sloped, the ball was placed in a spot on the upper part of the enclosure so that when the birds pick at it, it rolls down the slope and comes to rest in the pond. None of the couples found this enrichment interesting but it proved successful with the lone male, Pimampiro. When the ball was introduced, he was observed walking around it and then picking at it (Fig.11). When the ball started to roll, he ran after it. Once the ball was in the pond, he tried to pick at it from the edges, walking around the pond and then finally decided to go in after it and continued to interact with the ball (Fig.12). This behavior was observed on multiple occasions, often for 15-20 minutes at a time.

► Traffic cone

The cones are sometimes put directly in the enclosures or left in after being used as a feeding enrichment. They are open on their top and a rope long enough to stick out of both sides is passed through. Condors can interact directly with the cone or make it move better by pulling on the rope. This enrichment didn't show great results. Although all the condors got curious about it and came close to it, they neglected it quickly.

Only two males, Rucu and Pimampiro, were seen spending time on it. These interactions were usually short, two or three minutes, with only one seven-minute

observation for Pimampiro. In the case of Rucu, this interaction could be repeated several times during the day. Pimampiro tended more to interact with the cone but left it on the same spot. Rucu was more inclined to pull the cone throughout the enclosure (Fig.13).

► Yellow leaves

The idea of using old leaves as enrichment came after Ayu and Inti were seen picking at some that were stuck on the enclosure by the wind and the rain. Old leaves were collected and fixed on the wire netting of all enclosures. Unfortunately, this enrichment proved fruitless. Inti is the only condor who interacted with the leaves, and never for a long time (Fig.14). Some were also hung within the enclosures with similar results.

Conclusion

Overall, the most successful enrichments, both environmental and for food, were those presenting hanging material. All condors interacted with these enrichments, and many interactions lasted more than 20 minutes, with some lasting up to one hour. The Zuleta condors definitely seem to prefer enrichments they can pull on or make swing by picking at them.

Other enrichments can be considered effective. One conclusion that was reached is that the success of an enrichment can greatly depend on the personality of the birds. On this matter, the seven condors in this study are very different. Ayu and Inti are the most playful couple, but they don't like enrichment with hidden food. Pimampiro is very curious and will interact with various enrichments, but for shorter periods of time than Ayu and Inti. Among the two other couples, the males interact much more with enrichment than their females, who show little interest in enrichment. Rucu and Tarishka have an intermediate level of curiosity and interaction. Rucu is the one who moves objects the most.

Another thing to take into account when providing enrichment for condors is to know the degrees of intimacy and dominance within the couples. Each of the Zuleta pairs is different. Ayu and Inti are the closest couple, and there is no dominant individual. This means that they do not always require two separate enrichments as they sometimes work together on the same one without fighting. Coya and Tarishka are also very close, but Tarishka is clearly the dominant of the two. Due to this, it is better to provide two separate feeding enrichments to give

Coya the opportunity to work. Despite this, they can also sometimes interact together on the same enrichment. The final pair, Reina Pacha and Rucu, shows no intimacy and Rucu is strongly dominant over Reina Pacha. Two separate enrichments are always necessary to allow Reina Pacha the chance of interaction, especially with feeding enrichment.

My thanks to:

- ▶ Ximena Pazmiño, Fernando Polanco and Carolina Mosquera, the *triumvirate* of the Galo Plaza Lasso Foundation.
- ▶ Miguel Cachipundo, keeper of the condors, for the help with the enrichments.
- ▶ All the volunteers I had in 2013 for the long hours of observation and the data collection.
- ▶ Evelyn Capelin for proof-reading and editing this paper (in addition to her work as a volunteer). 🐘

Editor's Comments

By Casey Plummer

As this article shows, not all individuals of a particular species will respond to an enrichment in the same way. Differences in age, temperament, sex, experience and pairing can have an effect on the success of an enrichment. That is why observations of the type carried out in this paper (both qualitative and quantitative) are so important. The author does a good job explaining how and why modifications to enrichments were made in response to observations, such as hanging a coconut, rope ball or plastic ball after observing the interactions of the condors with the hanging meat, or offering multiple hanging meat enrichments in locations appropriate to each pair. The diversity of enrichments presented here has given me several ideas to try with the vultures at my zoo! Thanks, Yann!

Do you have Enrichment Options to share? Make submissions to bhc@aaazk.org! Have a great idea, but aren't confident in your writing? Our editors can help!

Address for Yann's copy:

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Casilla postal 10-03-12
Ibarra, Imbabura,
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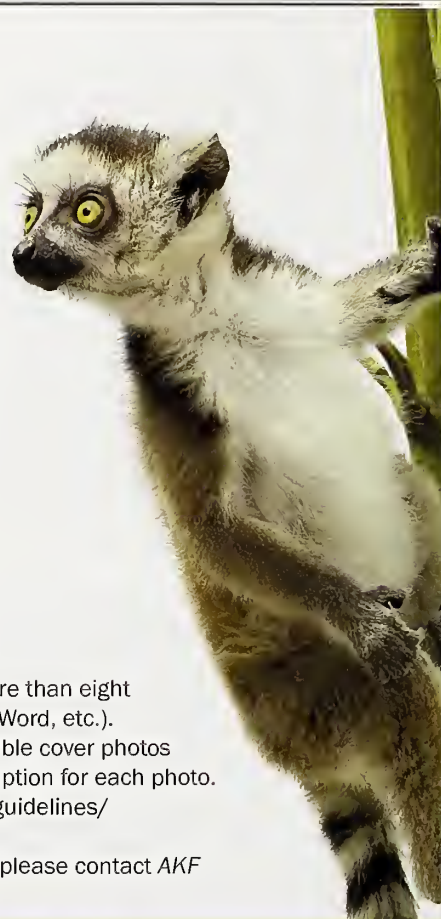
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